

(3 Hours)

Marks: 80

Note: Question No. 1 is Compulsory

Attempt any three out of the remaining five questions

Assumptions made should be clearly stated

Draw suitable diagram where ever necessary

- Q.1. Attempt any four sub-questions.** Marks
- Describe Moore machine with all tuples in detail. 5M
 - Arrange a mealy machine to accept all strings ending with 00 or 11. 5M
 - Design DFA to accept strings over the alphabet $\Sigma = \{a,b\}$ containing even number of a's. 5M
 - Evaluate given context-free grammar and Identify whether it is ambiguous or not. 5M

$$S \rightarrow a \mid Sa \mid bSS \mid SSb \mid SbS$$
 - Draw diagram for Chomsky hierarchy and Show all the types with proper explanation. 5M
- Q.2.**
- Design NFA for accepting input strings that contain either the keyword 000 or the keyword 010 and convert it into an equivalent DFA 10M
 - Design a DFA corresponding to regular expression 10M
 $(a+b)^*aba(a+b)^*$
- Q.3.**
- Design a Mealy machine that accepts strings ending in "00" and "11". Convert the same to Moore Machine 10M
 - Define CFG, obtain CFG for the following grammar 10M
 $(110+11)^*(10)^*$
- Q4.**
- Construct a Turing machine accepting palindromes over $\Sigma = \{a,b\}$ 10 M
 - Design a PDA for $L = \{ a^n b^n \mid n \geq 1 \}$ 10 M
- Q5.**
- Design a Moore machine which counts the occurrence of substring bba in input string. 10 M
 - Design a TM accepting the set of strings with equal number of 0's and 1's over $\{0,1\}^*$ 10 M
- Q6.**
- Write Short note on: Halting Problem in TM. 10 M
 - Explain applications of FM, PDA and Turing Machine with example. 10 M
